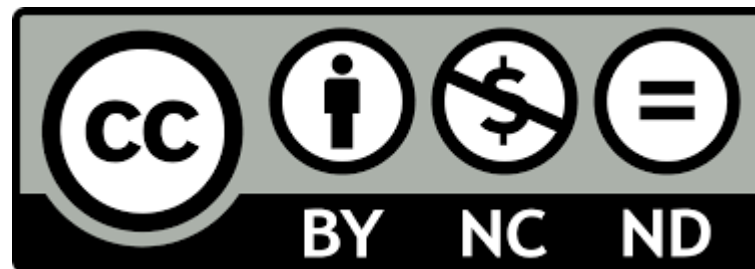




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2nd Ice Prediction Workshop

Welcome and Introduction

Organizing Committee

Sponsored by the AIAA Atmospheric and Space Environments
Technical Committee (ASE TC)

AIAA IPW-2

Vienna, Austria

22-23 June 2023

Outline

- Motivation and Background
- 1st Ice Prediction Workshop
- Workshop Principles and Objectives
- Organizing Committee Members
- Acknowledgements
- Workshop Agenda

Motivation and Background

Motivation

- Assess the current capabilities of 3D icing simulation tools.
- Bring together code developers and user communities.
- Identify areas that need additional research and development.

Background

- SAE AC-9C Meeting, Reno, October 16, 2018
 - Pitched the idea of an Ice Prediction Workshop
 - Reviewed NATO RTO Comparison Workshop conducted in 2000.
- SAE AC-9C Meeting, Minneapolis, June 17, 2019
 - Decided to go forward and began assembling a committee of volunteers.
 - Kick-off meeting held on November 20, 2019 with goal of 1st IPW in June of 2021 in conjunction with the AIAA Aviation Forum.

IPW-1 Summary

- Conducted virtually 26-29 July 2021 prior to AIAA Aviation Forum.
- Featured 8 baseline test cases and 8 optional cases
 - Included: 2D geometry, multi-element airfoil, axisymmetric inlet, swept wing and large drop cases.
- Main objective was to baseline tool capability for a range of icing problems.
- Outstanding participation
 - 79 registered attendees (11 countries, 4 continents)
 - 21 presentations
 - 19 participants submitted data for comparison
- More details in presentation to follow

Workshop Principles

- This is a community effort to share knowledge, information, and head towards a common understanding of best practices for icing modeling and simulation. It should not be perceived as a competition of codes and groups.
- The goal is to focus on 3D icing simulation tools. This is not to diminish the importance, value and need for 2D tools. Past work on 2D tools and have provided the necessary groundwork for current 3D tools.
- Icing simulation tools have many common components such as airflow, particle trajectories (collection efficiency), mass and energy balances (surface water, heat transfer) and ice growth. The workshop is structured to evaluate compare the results of such components.
- We envision a series of workshops to address the wide-ranging problems in icing simulation.

Workshop Objectives (IPW-2)

- Focus on assessment of current 3D icing simulation capability for ice shapes on large swept wings and low-speed straight wing.
 - Define test cases and geometries based upon existing, known and publicly available geometries and data.
- Compare results for airflow (surface pressure distribution), collection efficiency, freezing fraction, surface temperature, heat transfer coefficient ice shape cross section, etc.
- Use the results of this workshop to identify cases for future workshops including how to gather experimental data from different facilities, “blind” comparisons and expansion into other problems such as engine icing, rotorcraft, ice protection systems, probes, iced aerodynamics, etc.

Organizing Committee*

Adam Malone	Boeing
Alberto Pueyo	Bombardier
Alessandro Donizetti Tommaso Bellosta	Politecnico di Milano
Andy Broeren	NASA
Bryan Hinson	Textron Aviation
Chris Nelson	Siemens
Don Cook	Independent
Guy Fortin	Bombardier
Richard Hann Markus Linder	Norwegian Univ. of Science and Technology
Emmanuel Radenac	ONERA

Eric Laurendeau Maxime Blanchet	Ecole Polytechnique, Montreal
Eric Stewart	NAVAIR
Ezgi Oztekin	FAA
Guilherme A. Lima da Silva	Aerothermal Solutions
Ifrac Mussa	Kingston Univ. London
Isik Ozcer	Ansys
Karthik Narayanasamy	Honeywell
Peter Forsyth	National Research Council
Richard Moser	AeroTex
William Wright	HX5, LLC
Xin Yang	University of Oxford

*Regular contributors

Acknowledgements

- Many volunteers on the organizing committee dedicated countless hours to preparing the test cases, developing meshes, manipulating CAD geometry, collecting experimental data, post-processing data, comparison plots, website hosting, etc., etc.
- SAE International for including IPW-2 into conference program.
- Tecplot for providing access to software for post processing.

Supporting Information

- SAE AC-9C Aircraft Icing Technology Committee
 - AC-9C Information: <https://standardsworks.sae.org/standards-committees/ac-9c-aircraft-icing-technology-committee>
- AIAA Atmospheric and Space Environments Technical Committee
 - ASE TC Information: <https://www.aiaa.org/get-involved/committees-groups/technical-committees>
- Ice Prediction Workshop: www.icepredictionworkshop.com

Workshop Agenda

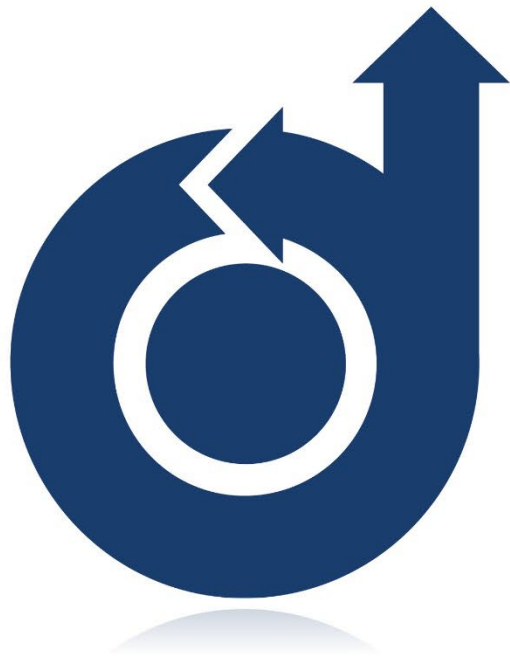
➤ This session

13:00	13:10	Ice Prediction Workshop—Background and Motivation <i>Andy Broeren - NASA Glenn, Éric Laurendeau – Polytechnique Montréal</i>
13:10	13:25	Summary of IPW-1 <i>Éric Laurendeau – Polytechnique Montréal</i>
13:25	13:45	IPW-2 Test Cases <i>Isik Ozcer – ANSYS Canada</i>
13:45	14:10	Code-to-code Comparisons – Case 1 <i>Maxime Blanchet – Polytechnique Montréal</i> Questions / Discussion (5 minutes)
14:10	14:35	Code-to-code Comparisons – Case 2 <i>Maxime Blanchet – Polytechnique Montréal</i> Questions / Discussion (5 minutes)
14:35	15:00	Code-to-code Comparisons – Case 3 <i>Maxime Blanchet – Polytechnique Montréal</i> Questions / Discussion (5 minutes)

Workshop Agenda—Tomorrow

08:00	08:30	Welcome and Introduction	
		<i>Andy Broeren - NASA Glenn, Éric Laurendeau – Polytechnique Montréal</i>	
08:30	08:40	Public Database Development Opportunity	
		<i>Richard Moser – AeroTex</i>	
Break			
08:50	09:10	Politecnico Di Milano	SU2 7.5.1
		<i>Alessandro Donizetti</i>	
09:10	09:30	Seoul National University	ICEPAC, 2023
		<i>Soonho Shon</i>	
09:30	09:50	JAXA	FaSTAR/In-house code
		<i>Kei Shimura & Yuki Ide</i>	
09:50	10:10	ANSYS Canada	FENSAP-ICE v23R2
		<i>Isik Ozcer</i>	
Break			
10:30	10:50	Gulfstream	NASA USM3D/LEWICE3D
		<i>Gregory Gathy</i>	
10:50	11:10	Polytechnique Montréal	CHAMPS-ICE
		<i>Maxime Blanchet</i>	
11:10	11:30	CIRA	SIMBA
		<i>Francesco Capizzano</i>	
11:30	11:50	ONERA	IGLOO3D v1.3.0.0
		<i>Adèle Veilleux?</i>	

Lunch			
12:50	13:10	Bombardier	Dragon Ice Suite Version 1.2
		<i>Guy Fortin</i>	
13:10	13:30	Boeing	CFD++ Version 17.1/LEWICE3D
		<i>Adam Malone</i>	
13:30	13:50	NRC	ANSYS Fluent 2021R2
		<i>Pete Forsyth</i>	
Break			
14:10	14:25	NTNU	FENSAP-ICE v22R2
		<i>Richard Hann?</i>	
14:25	14:40	Kingston University London	FENSAP-ICE v22R1
		<i>Ifrah Mussa</i>	
14:40	14:55	TUBS	DICEPS 2D V3/FLUENT
		<i>Denis Sotomayor-Zakharov</i>	
14:55	15:10	NASA Glenn	GlennICE v3.1.0
		<i>Thomas A. Ozoroski</i>	
Break			
15:30	16:00	Summary and Wrap-up	
		<i>Andy Broeren - NASA Glenn, Éric Laurendeau – Polytechnique Montréal</i>	



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